Features

- The AM Transceiver Trainer is designed to teach and demonstrate the principles of AM transmissions and reception system.
- The trainer consist of modular block to enable the student to learn AM Transmitter and Receiver system in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- The trainer completed with fault simulator and fault indicator. The fault simulator can be used to teach troubleshooting.
- Completed with test point to show the wave form of AM signal system.
- All input and output on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive Experiment manual book to guide the student step by step in conducting experiments.

AM Transceiver Trainer

PT 94329

Covered Topics

- TE07001E Power Supply
- TE07002E X'tal Oscillator
- TE07003E Buffer
- TE07004E Driver/Power RF
- TE07005E Modulator
- TE07006E Tuner & Mixer
- TE07007E IF Section
- TE07008E Audio Amplifier

Specification

- **Power Supply [PTE-017-08]**
  - Input voltage : 220V, 50Hz
  - Output voltage : +15VDC, 2.5A
- **Receiver Section [PTE-017-05] ; [PTE-017-06]**
  - Frequency range : SW1 : 3 – 7 MHz; SW2 : 7 – 12 MHz
  - Electrowave mode : AM / CW
  - IF frequency : 455kHz
  - Sensitivity : 2µV (approx.)
  - Input voltage : +15VDC
- **Transmitter Section [PTE-017-01] ; [PTE-017-02] ; [PTE-017-03] ; [PTE-017-04]**
  - Frequency : 3.579MHz (X'tal controlled oscillator)
  - RF power output : 5W (approx.)
  - Transmission mode : DSB
  - Output load : 50?
  - Input voltage : 15VDC
- **Audio Amplifier [PTE-017-07]**
  - Input voltage : +15VDC
  - Power output : 2W (approx.)

PT 94329 AM Transceiver Trainer
consists of

Cat. No.	Description	Qty.
PTE-017-01	X-Tal Oscillator	1 pc
PTE-017-02	Buffer	1 pc
PTE-017-03	Driver / Power RF	1 pc
PTE-017-04	Modulator	1 pc
PTE-017-05	Tuner & Mixer	1 pc
PTE-017-06	IF Section	1 pc
PTE-017-07	Audio Amplifier	1 pc
PTE-017-08	Power Supply	1 pc
FEL 220 01	Telescopic Antenna	1 pc
GSE 230 05	BNC to BNC Connecting Coaxial Cable	1 pc
FLS 20.02/097	Connecting Cross	30 pcs
KAL 99/40-050	Connecting Lead 50cm, Yellow	20 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	6 pcs
KAL 99/10-075	Connecting Lead 75cm, Black	2 pcs
KAL 99/20-075	Connecting Lead 75cm, Red	2 pcs
T07S-01E	Experiment Manual Book	1 pc
GSN 240	TPS Frame 600mm	1 set

Oscillator X'TAL
PTE-017-01

Buffer
PTE-017-02

Driver / Power RF
PTE-017-03

Modulator
PTE-017-04

Tuner and Mixer
PTE-017-05

IF Section
PTE-017-06

Audio Amplifier
PTE-017-07

Power Supply
PTE-017-08

Specifications and illustrations are subject to change without prior notice

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Features

- The FM Transceiver Trainer is designed to teach and demonstrate the principles of FM transmissions and reception system.
- The trainer consist of modular block to enable the student to learn FM Transmitter and Receiver system in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- Completed with test point to show the wave form of FM signal system.
- All input and output on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive Experiment manual book to guide the student step by step in conducting experiments.

FM Transceiver Trainer

PT 94330

Covered Topics

- TE08001E Power Supply
- TE08002E Stereo MPX Encoder
- TE08003E Stereo FM Transmitter
- TE08004E Stereo FM Receiver
- TE08005E Audio Amplifier

Specification

- Power Supply [PTE-018-06]
  - Input voltage : 220V, 50Hz
  - Output voltage : +15VDC, 2.5A
- Receiver Section [PTE-018-03]
  - Frequency range : 88 – 108 MHz
  - IF frequency : 10.7MHz
  - Stereo MPX carrier : 38kHz
  - Stereo pilot : 19kHz
  - Sensitivity : 2µV (approx.)
  - Input voltage : +15VDC
- Stereo Multiplexer section [PTE-018-01]
  - Stereo sub carrier : 38kHz
  - Internal tone generator : 1kHz & 3kHz (switchable)
  - Input voltage : +15V
- Transmitter Section [PTE-018-02]
  - Frequency : 95MHz or 100MHz (switchable)
  - Frequency stabilization : PLL (Phase Lock Loop)
  - RF power output : 1W (approx.)
  - Output load : 50?
  - Input voltage : +15V
- Audio Amplifier [PTE-018-04]
  - Input voltage : +15VDC
  - Power output : 2W (approx.)

PT 94330 FM Transceiver Trainer
consists of

Cat. No.	Description	Qty.
PTE-018-01	Stereo MPX Encoder	1 pc
PTE-018-02	FM Transmitter	1 pc
PTE-018-03	Stereo FM Receiver	1 pc
PTE-018-04	Audio Amplifier	1 pc
PTE-018-05	Speaker	2 pcs
PTE-018-06	Power Supply	1 pc
GSE 230 05	BNC to BNC Connecting Coaxial Cable	1 pc
FEL 220 01	Telescopic Antenna	1 pc
FLS 20.02/097	Connecting Cross	30 pcs
KAL 99/30-050	Connecting Lead 50cm, Yellow	20 pcs
KAL 99/10-075	Connecting Lead 50cm, Blue	6 pcs
KAL 99/10-075	Connecting Lead 75cm, Black	2 pcs
KAL 99/20-075	Connecting Lead 75cm, Red	2 pcs
T08S-01E	Experiment Manual Book	1 pc
GSN 240	TPS Frame 600mm	1 set

Stereo MPX Encoder
PTE-018-01

FM Transmitter
PTE-018-02

Stereo FM Receiver
PTE-018-03

Audio Amplifier
PTE-018-04

Speaker
PTE-018-05

Power Supply
PTE-018-06

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Basic Electronic Trainer

PT 93120

Features

- The trainer is designed for presentation and to practice the principles of basic electronics that covers; characteristic of electronic component, regulation, stabilization and protection of power supply, applied component in circuits, op-amp and filter circuits.
- Complete with assembly board that can be used to assemble the circuit with available discrete module's likes resistors, capacitors, transistors, etc. The connecting cross and connecting lead are used to connect the circuit to power supply.
- The system consist of modular block that enable the student to learn the basic electronic in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Connecting leads, connecting cross and other connecting device are supplied in sufficient quantity to do all experiments.
- Complete with comprehensive Experiment manual book to guide the student step by step in conducting experiments.

Covered Topics

- EE02001 Introduction to Electronics
- EE02002 Ohm's Law
- EE02003 Thevenin's Theorem 1
- EE02004 Thevenin's Theorem 2
- EE02005 The Theorem of Superposition
- EE02006 Series Coupled Resistance and Voltage Divider
- EE02007 Parallel Coupled Resistance and Current Divider
- EE02008 Wheatstone Bridge
- EE02009 Non-linear Resistance
- EE02010 Capacitors and Resistors Coupled in Series
- EE02011 AC Signals
- EE02012 The Influences of AC Signals on Resistors
- EE02013 The Influences of AC Signals on Coils
- EE02014 The Influences of AC Signals on Capacitor
- EE02015 Series Coupled RLC and Series Coupled Resonance
- EE02016 Series Coupled Oscillator Circuit
- EE02017 The Influence of AC Signals on Parallel RC Circuits
- EE02018 The Influences of AC Signals on Parallel RL Circuits
- EE02019 Parallel Coupled RLC and Parallel Resonance
- EE02020 Parallel Coupled Oscillator Circuits
- EE02021 Filter
- EE02022 Response of Integrator and Differentiator Circuit on Square Waves
- EE02023 Response of Integrator and Differentiator Circuits on Triangle Waves
- EE02024 Common Emitter Transistor Amplifier
- EE02025 Common Collector Transistor Amplifier
- EE02026 Transistor as a Switch
- EE02027 Schmitt Trigger
- EE02028 Mono Stable Multivibrator
- EE02029 Bistable Multivibrator
- EE02030 Astable Multivibrator
- EE02031 RC Coupled Amplifier
- EE02032 Direct Coupled Amplifier
- EE02033 Direct Coupled with Complementary Transistor
- EE02034 Common Source FET Amplifier
- EE02035 Common Drain FET Amplifier
- EE02036 Op-Amp as Voltage Follower
- EE02037 Non-Inverting Op-Amp Amplifier
- EE02038 Inverting Op-Amp Amplifier
- EE02039 Uni-Junction Transistor
- EE02040 DIAC
- EE02041 SCR and TRIAC
- EE02042 Half Wave Rectifier
- EE02043 Full Wave Rectifier
- EE02044 Power Control Using SCR
- EE02045 Characteristic of Electrical Sources
- EE02046 Current Sources Employing FET
- EE02047 Current Sources Employing Bipolar Transistor

Specification

- Assembly Board for TPS Panel [GSE 110]
  - Mountable to standard frame, used to assemble the experiment circuits from modular component
  - 24 socket grids with 24 conducting squares and 216 sockets 6 socket grids with 36 sockets
  - 2 conducting paths with 18 sockets each.
  - Dimensions : 297 × 300 mm
- Power Supply [PTE-005-01]
  - Output voltage : DC 5V / 1A ; 15V / 1A ; -15V / 1A
  - Input voltage : AC 220V, 1 phase 50Hz
  - Output connections : 4mm sockets
  - Dimension : 114 × 297 mm
- Voltage/Current Source [PTE-005-02]
  - Voltage source : DC Variable 0 up to 12V / 250mA
  - Current source : 0 up to 500mA
  - Input voltage : 220V, 1 phase 50Hz
  - Output connections : 4mm sockets
  - Dimension : 114 × 297 mm
- Basic Meter [KAL-41]
  - Amperemeter, range : 100uA — 100mA — 1A and 5A (DC)
  - Voltmeter, range : 100mV — 1V — 10V and 50V (DC)
- Section Boxes, consist of:
  - Diode 1A, Diode Zener, DIAC, LED
  - Resistors, Potentiometers
  - Transistors, TRIAC, SCR, FET
  - LDR, NTC, PTC
  - Op-Amp
  - Toggle Switches
  - Capacitors
  - UI Core with 500 and 1000 Winding Coil

Power Supply
PTE-005-01

Voltage/Current Source
PTE-005-02

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PT 93120 Basic Electronic Trainer
consists of

Cat. No.	Description	Qty.
GSE 110	Assembly Board for TPS Panel	2 pcs
PTE-005-01	Power Supply	1 pc
PTE-005-02	Voltage/Current Source	1 pc
KAL-41	Basic Meter	2 pcs
PTE-005-03	Discreet Component Container - 1	1 set
PEO 339 01	Resistor 1? , 0.5W	1 pc
PEO 341 03	Resistor 3.3? , 2W	1 pc
PEO 339 03	Resistor 10? , 0.5W	2 pcs
PEO 339 05	Resistor 220, 0.5W	1 pc
PEO 339 07	Resistor 470, 0.5W	1 pc
PEO 339 08	Resistor 560, 0.5W	1 pc
PEO 339 10	Resistor 1000, 0.5W	2 pcs
PEO 339 11	Resistor 1500, 0.5W	1 pc
PEO 344 01	Resistor 2200, 0.5 W	1 pc
PEO 339 13	Resistor 2700, 0.5W	1 pc
PEO 339 14	Resistor 3300, 0.5W	1 pc
PEO 339 15	Resistor 3900, 0.5W	1 pc
PEO 339 16	Resistor 4700, 0.5W	1 pc
PEO 339 17	Resistor 5600, 0.5W	1 pc
PEO 339 19	Resistor 1kO, 0.5W	4 pcs
PEO 339 20	Resistor 1,5kO, 0.5W	2 pcs
PEO 339 21	Resistor 2,2kO, 0.5W	1 pc
PEO 339 22	Resistor 3,3kO, 0.5W	1 pc
PEO 339 23	Resistor 4,7kO, 0.5W	2 pcs
PEO 339 24	Resistor 10kO, 0.5W	2 pcs
PEO 339 25	Resistor 12kO, 0.5W	1 pc
PEO 339 32	Resistor 47kO, 0.5W	1 pc
PEO 339 35	Resistor 82kO, 0.5W	1 pc
PEO 339 36	Resistor 100kO, 0.5W	2 pcs
PEO 339 42	Resistor 470kO, 0.5W	1 pc
PEO 339 44	Resistor 1MO / 0.5W	1 pc
FLS 20.04/101	SPST Toggle Switch	2 pcs
PEO 102 02	Incandescent Lamp 3V + Lamp Holder E10	2 pcs
PEO 102 03	Incandescent Lamp 6V + Lamp Holder E10	2 pcs
PEO 102 04	Incandescent Lamp 12V + Lamp Holder E10	1 pc
FLS 20.07/103	Lamp Holder E10	3 pcs
FET 23.04	Neon Lamp	1 pc
PEL 222	Amperemeter Adapter	3 pcs
PEO 372 01	Red LED	1 pc
PEO 372 03	Green LED	1 pc
FLS 28.08/101	Potentiometer 1kO, 0.25W	2 pcs
PEO 322 03	Potentiometer 100kO, 0.25W	1 pc
PTE-005-04	Discreet Component Container - 2	1 set
FET 23.05	LDR	1pc
PEO 411 02	Capacitor Non Polar 100nF	1 pc
PEO 411 03	Capacitor Non Polar 470nF	1 pc
PEO 412 01	Capacitor Tantalum 1µF/35V	1 pc
PEO 396 23	Capacitor Electrolyte 1µF/16V	1 pc
PEO 396 09	Capacitor Electrolyte 10µF/35V	5 pcs
PEO 396 10	Capacitor Electrolyte 100µF/35V	2 pcs
PEO 396 20	Capacitor Electrolyte 2200µF/35V	1 pc
FET 23.01	Diode 1N4002	4 pcs
PEO 360 11	Diode 1N60	1 pc
PEO 365 03	Diode Zener 5V, 0.25W	1 pc
PEO 370	DIAC DB3	1 pc
PEO 513	SCR C106	1 pc
PEO 511 01	TRIAC BT137D	1 pc
PEO 378 05	Transistor BC 547	3 pcs
PEO 378 04	Transistor BC 556	1 pc
PEO 382 01	FET SK-125	1 pc
PTE-005-05	Discreet Component Container - 3	1 set
FEM 21.00	U & I Core	1 pc
FEM 21.01/500	Coil 500 turns	1 pc
FEM 21.01/102	Coil 1000 turns	1 pc
PEO 512	UJT 2N246	1 pc
PEO 514	Operational Amplifier LM 741	1 pc
PEO 503 03	SPDT Toggle Switch	1 pc
PEO 503 02	DPDT Toggle Switch	1 pc
GSE 220	Battery Holder 1,5V	2 pcs
FLS 20.31/27	Battery 1,5V	2 pcs
GSE 220 04	Battery Holder 9V	1 pc
GSE 221 02	Battery 9V	1 pc
PTE-005-06	Discreet Component Container - 4	1 set
FLS 20.14/112	Bar Magnet	1 pc
FLS 20.13/111	Bimetal (set)	1 pc
PEO 500 01	NTC	1 set
PEO 500 02	PTC	1 set
FLS 20.02/097	Connecting Cross	40 pcs
KAL 99/40-030	Connecting Lead 30cm, Yellow	30 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	10 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	10 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	20 pcs
E02S-01E	Experiment manual Book	1 pc
GSN 240	TPS Frame 600mm	1 set

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Features

- The trainer is designed for general purpose training that offers ability to perform variation design of circuit and experiment function.
- The trainer provides jumper wires and a large size of breadboard for quick assembly of experiment circuit.
- Desktop type, easy to handle.
- Complete with power supply, function generator, voltmeter, amperemeter, speaker, buzzer and decade capacitors to support the experiment.
- All inputs and outputs are equipped with robust 4-mm sockets for easy connection.
- Connecting leads, connecting cross and other connecting device are supplied in sufficient quantity to do all experiments.
- Complete with comprehensive Experiment manual book to guide the student step by step in conducting experiments.
- The teacher and student can make their own experiments.

Laboratory Breadboard

PT 93132

Covered Topics

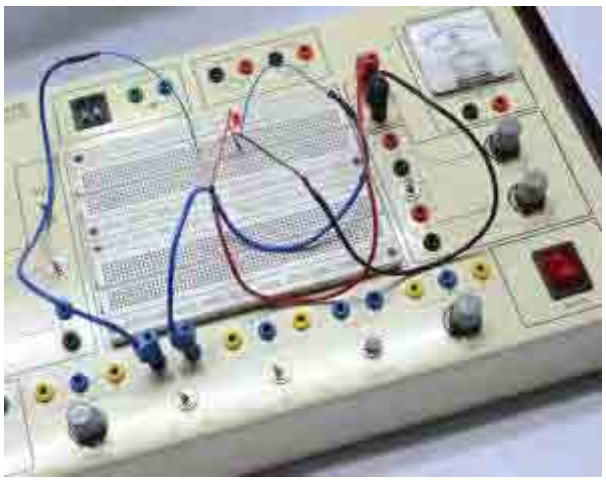
EE03001	Transistor as a Switch
EE03002	Schmitt Trigger
EE03003	Op-Amp as Voltage Follower
EE03004	Non-Inverting Op-Amp Amplifier
EE03005	Inverting Op-Amp Amplifier
EE03006	Mono Stable Multivibrator
EE03007	Bistable Multivibrator
EE03008	Astable Multivibrator

Specification

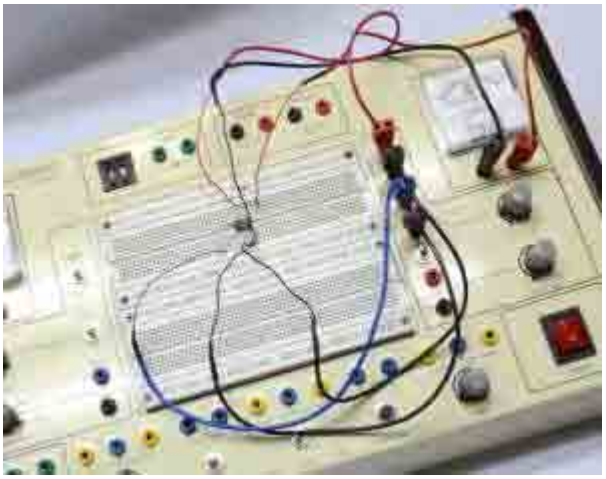
- **Desktop Module [PTE-013-01],** equipped with:
  - Project board
    - -Standard breadboard, mounted on desktop, used to assemble the experiments circuits from discrete component
    - Size: 175 × 134 × 8 mm
  - Power Supply
    - Output : +5VDC / 1A
      Variable 0 – 60VDC / 500mA
      30VAC / 250mA CT
    - Input : 220VAC, 1 phase 50Hz
    - Output connections: 4mm
  - Function Generator
    - Frequency : 100Hz – 10KHz
    - Decade Attenuation Control 10mV, 100mV and 1V
    - Sine Wave and Triangle Wave output
  - DC Voltmeter
    - Range : 0 – 30 V
  - DC Amperemeter
    - Range : 0 – 3 A
  - Decade capacitor : 0 – 99 nF
  - Speaker : 2¼", 8? , 0.5W
  - Buzzer : 12V
  - Switches are SPDT Toggle Switch, SPST Toggle Switch, Push-On
- **Container Box [PTE-013-02],** consist of:
  - Diode 1A, ZD, LED
  - Resistors, Potentiometers
  - Transistors
  - Op-Amp
  - Capacitors

PT 93132 Laboratory Breadboard
consists of

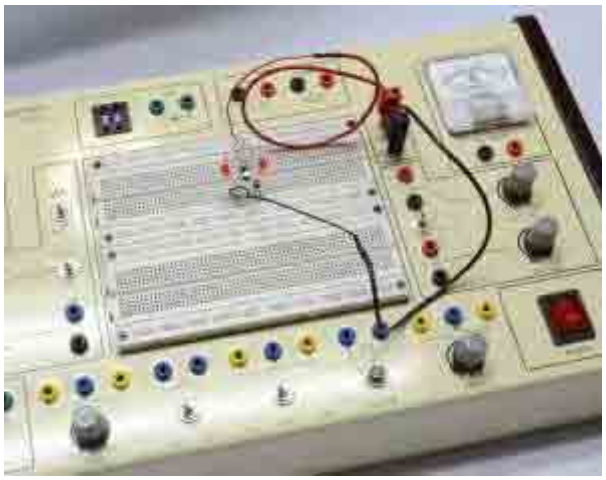
Cat. No.	Description	Qty.
PTE-013-01	Desktop Module	1 set
PTE-013-02	Container Box, consist of:	1 set
PEO 394 01	Capacitor 1nF Non Polar	2 pcs
PEO 394 02	Capacitor 2.2nF Non Polar	2 pcs
PEO 394 03	Capacitor 4.7nF Non Polar	2 pcs
PEO 394 04	Capacitor 6.8nF Non Polar	2 pcs
PEO 394 05	Capacitor 10nF Non Polar	2 pcs
PEO 394 06	Capacitor 22nF Non Polar	2 pcs
PEO 394 07	Capacitor 47nF Non Polar	2 pcs
PEO 394 08	Capacitor 68nF Non Polar	2 pcs
PEO 394 09	Capacitor 100nF Non Polar	2 pcs
PEO 394 10	Capacitor 220nF Non Polar	2 pcs
PEO 394 11	Capacitor 470nF Non Polar	2 pcs
PEO 394 12	Capacitor 680nF Non Polar	2 pcs
PEO 390 01	Capacitor 1µF, 16V Electrolyte	2 pcs
PEO 390 02	Capacitor 2,2µF, 16V Electrolyte	2 pcs
PEO 390 03	Capacitor 4,7µF, 16V Electrolyte	1 pc
PEO 390 05	Capacitor 10µF, 16V Electrolyte	2 pcs
PEO 390 08	Capacitor 22µF, 16V Electrolyte	2 pcs
PEO 390 04	Capacitor 47µF, 16V Electrolyte	1 pc
PEO 390 09	Capacitor 100µF, 16V Electrolyte	2 pcs
PEO 390 10	Capacitor 220µF, 16V Electrolyte	2 pcs
PEO 390 11	Capacitor 470µF, 16V Electrolyte	1 pc
PEO 331 03	Resistor 10Ω, 0.5 W	10 pcs
PEO 331 06	Resistor 33Ω, 0.5 W	10 pcs
PEO 331 09	Resistor 68Ω, 0.5 W	10 pcs
PEO 331 10	Resistor 82Ω, 0.5 W	10 pcs
PEO 331 11	Resistor 100Ω, 0.5 W	10 pcs
PEO 331 15	Resistor 330Ω, 0.5 W	10 pcs
PEO 331 19	Resistor 680Ω, 0.5 W	10 pcs
PEO 331 20	Resistor 820Ω, 0.5 W	10 pcs
PEO 331 21	Resistor 1kΩ, 0.5 W	10 pcs
PEO 331 24	Resistor 3.3kΩ, 0.5 W	10 pcs
PEO 331 26	Resistor 6.8kΩ, 0.5 W	10 pcs
PEO 331 27	Resistor 8.2kΩ, 0.5 W	10 pcs
PEO 331 28	Resistor 10kΩ, 0.5 W	5 pcs
PEO 331 34	Resistor 33kΩ, 0.5 W	5 pcs
PEO 331 38	Resistor 68kΩ, 0.5 W	5 pcs
PEO 331 39	Resistor 82kΩ, 0.5 W	5 pcs
PEO 331 40	Resistor 100kΩ, 0.5 W	5 pcs
PEO 331 44	Resistor 330kΩ, 0.5 W	5 pcs
PEO 331 47	Resistor 680kΩ, 0.5 W	5 pcs
PEO 331 48	Resistor 820kΩ, 0.5 W	5 pcs
PEO 331 49	Resistor 1MΩ, 0.5 W	5 pcs
FLS 20.08/101	Variable Resistor 1kΩ	2 pcs
FLA 20.08/103	Variable Resistor 10kΩ	2 pcs
PEO 322 03	Variable Resistor 100kΩ	2 pcs
PEO 361 03	Diode 1N4002	5 pcs
PEO 361 09	Diode 1N4148	5 pcs
PEO 361 11	Diode 1N60	2 pcs
PEO 373 01	LED 5mm, Red	4 pcs
PEO 377 02	Transistor BC 108	3 pcs
PEO 380 01	Transistor C 9012	3 pcs
PEO 380 02	Transistor C 9014	3 pcs
PEO 380 03	Transistor TIP 42C	1 pc
PEO 380 04	Transistor TIP 41	1 pc
PEO 514 01	Operational Amplifier UA 741	2 pcs
PEO 514 02	IC Timer LM 555	1 pc
PEO 180 01	Single Core Cable Ø 1mm, Red	5 m
PEO 180 02	Single Core Cable Ø 1mm, Black	5 m
GSE 234 01	Connecting Lead 20 cm, Red	30 cm
GSE 234 02	Connecting Lead 20 cm, Blue	30 cm
GSE 234 03	Connecting Lead 20 cm, Yellow	30 cm
GSE 234 04	Connecting Lead 20 cm, Black	30 cm
E03S-01	Experiment Manual Book	1 pc



EE03001 | Transistor as a Switch



EE03004 | Op-Amp as Voltage Follower



EE03008 | Astable Multivibrator

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Circuit Application Trainer

PT 94123

Features

- The trainer is designed for presentation and to practices the principles of basic electronic applications that covers; regulation, stabilization and protection of power supply, applied component in circuits and op-amp circuit.
- Completed with assembly board, that can be used to assemble the circuit with available discrete module's likes resistors, capacitors, transistors, etc. The connecting cross and connecting lead are used to connect the circuit to power supply.
- The system consist of modular block that enable the student to learn the basic electronic in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Connecting leads, connecting cross and other connecting device are supplied in sufficient quantity to do all experiments.
- Complete with comprehensive Experiment manual book to guide the student step by step in conducting experiments.

Covered Topics

EE05001	Common Emitter Transistor Amplifier
EE05002	Common Collector Transistor Amplifier
EE05003	Complementary Push Pull Amplifier
EE05004	Differential Transistor Amplifier
EE05005	Op-Amp as Voltage Follower
EE05006	Op-Amp as Comparator
EE05007	Op-Amp as Integrator
EE05008	Transistor as a Switch
EE05009	Astable Multivibrator
EE05010	Phase Shift Oscillator
EE05011	Triangle Wave Generator
EE05012	UJT Pulse Generator
EE05013	Bistable Multivibrator
EE05014	Staircase Generator
EE05015	Light Operated Alarm
EE05016	Delay Circuit
EE05017	Temperature Operated Switch
EE05018	Schmitt Trigger
EE05019	Light Operated Flasher
EE05020	Voltage Regulator

Specification

- **Assembly Board for TPS Panel [GSE 110]**
  - Mountable to standard frame, used to assemble the experiments circuits from modular component
  - 24 socket grids with 24 conducting squares and 216 sockets 6 socket grids with 36 sockets
  - 2 conducting paths with 18 sockets
  - Each dimensions: 297 × 300 mm
- **Power Supply [PTE-015-01]**
  - Output voltage : DC 5V / 1A ; 15V / 1A ; -15V / 1A
  - Input voltage : AC 220V, 1 phase 50Hz
  - Output connections : 4mm sockets
  - Dimension : 114 × 297 mm
- **Power Supply Variable [PTE-015-02]**
  - Output voltage : DC Variable 0 up to 12V / 250mA
  - Input voltage : AC 220V, 1 phase 50Hz
  - Output connections : 4mm sockets
  - Dimension : 114 × 297 mm
- **Staircase Generator [PTE-015-03]**
  - Input voltage : +15 VDC, -15 VDC
  - Output connections : 4mm sockets
  - Dimension : 114 × 297 mm
- **Basic Meter [KAL-41]**
  - Amperemeter, range : 100µA – 100mA – 1A and 5A (DC)
  - Voltmeter, range : 100mV – 1V – 10V and 50V (DC)
- **Section Boxes,** consist of:
  - Diode bridge 1A, Diode 1A, ZD, DIAC, LED
  - Regulator
  - Resistors, Potentiometers
  - Transistors
  - Op-Amp
  - Switch Change-Over SPDT
  - Buzzer
  - Relay

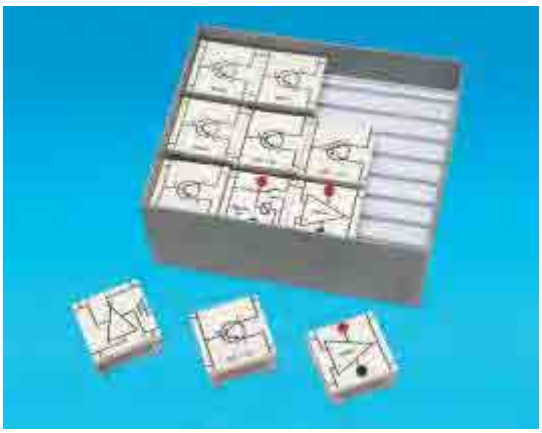
PT 94123 Circuit Application Trainer
consists of

Cat. No.	Description	Qty.
GSE 110	Assembly Board for TPS Panel	1 pc
PTE-015-01	Power Supply	1 pc
PTE-015-02	Variable Power Supply	1 pc
PTE-015-03	Staircase Generator	1 pc
KAL-41	Basic Meter	1 pc
PTE-015-04	Container Box I, consists of:	1 set
PEO 339 10	Resistor 100Ω, 0.5W	1 pc
PEO 339 15	Resistor 390Ω, 0.5W	1 pc
PEO 339 16	Resistor 470Ω, 0.5W	1 pc
PEO 339 19	Resistor 1kΩ, 0.5W	4 pcs
PEO 339 20	Resistor 1k5Ω, 0.5W	1 pc
PEO 339 21	Resistor 2k2Ω, 0.5W	1 pc
PEO 339 22	Resistor 3k3Ω, 0.5W	3 pcs
PEO 339 23	Resistor 4k7Ω, 0.5W	2 pcs
PEO 339 24	Resistor 10kΩ, 0.5W	2 pcs
PEO 339 32	Resistor 47kΩ, 0.5W	1 pc
PEO 339 33	Resistor 56kΩ, 0.5W	2 pcs
PEO 339 35	Resistor 82kΩ, 0.5W	1 pc
PEO 339 36	Resistor 100kΩ, 0.5W	3 pcs
PEO 339 37	Resistor 120kΩ, 0.5W	1 pc
PEO 339 38	Resistor 330kΩ, 0.5W	1 pc
PEO 339 42	Resistor 470kΩ, 0.5W	1 pc
FET 23.02 / 001	Capacitor Electrolyte 1µF, 35V	1 pc
PEO 396 09	Capacitor Electrolyte 10µF, 35V	3 pcs
PEO 396 10	Capacitor Electrolyte 100µF, 35V	1 pc
PEO 339 21	Capacitor Non Polar 10nF, 35V	3 pcs
PEO 396 22	Capacitor Non Polar 100nF, 35V	1 pc
FET 23.05	LDR	1 pc
PEO 516	Buzzer	1 pc
FET 23.01	Diode 1N4002	2 pcs
FLS 20.04/101	SPST Toggle Switch	2 pcs
PEO 310 01	SPDT Toggle Switch	2 pcs
PTE-015-05	Container Box II, consists of:	1 set
PEO 378 04	Transistor BC 546	2 pcs
PEO 378 05	Transistor BC 547	2 pcs
FET 23.03/139	Transistor BD 139	2 pcs
FET 23.03/140	Transistor BD 140	1 pc
PEO 514	Operational-Amplifier LM 741	2 pcs
PEO 517	Phase Inverter (LM741)	1 pc
PEO 515	Relay 6V	1 pc
PTE-015-06	Container Box III, consist of:	1 set
PEO 500 01	NTC	1 pc
FLS 20.08/11	Potentiometer 1kΩ	1 pc
PEO 322 04	Potentiometer 5kΩ	2 pcs
PEO 102 03	Incandescent Lamp 6V + Lamp Holder E10	1 pc
FEM 21.00	U & I Core	1 pc
PEO 372 03	LED, Green	1 pc
PEO 372 01	LED, Red	1 pc
PEO 512	UJT 2N2646	1 pc
FLS 20.02/097	Connecting Cross	40 pcs
KAL 99/40-030	Connecting Lead 30cm, Yellow	15 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	10 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	10 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	20 pcs
E05S-01E	Experiment Manual Book	1 pc
GSN 240	TPS Frame 600mm	1 set

Variable Power Supply
PTE-015-02

Staircase Generator
PTE-015-03

Container Box I
PTE-015-04



Container Box II
PTE-015-05

Container Box III
PTE-015-06

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Features

- The trainer is designed to cover the fundamental concept, theory and application of operational amplifier with descriptive and easy to understand.
- The trainer supplied with power supplies required to run the experiments.
- Desktop type, easy to handle.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Connecting leads, connecting cross and other connecting device are supplied in sufficient quantity to do all experiments.
- Complete with comprehensive Experiment manual book to guide student step by step in conducting experiments.

Operational Amplifier Trainer

PT 970232

Covered Topics

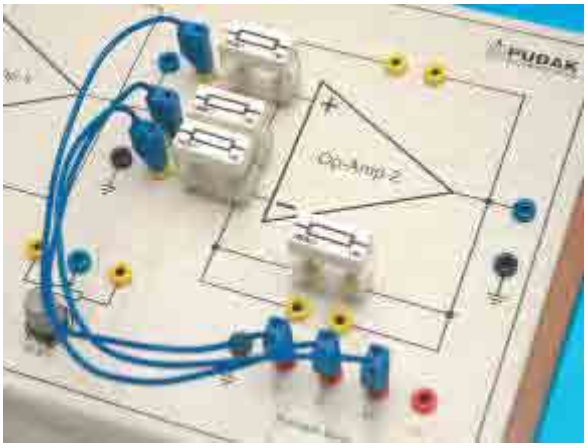
- EE07001 Comparator
- EE07002 Inverting Amplifier
- EE07003 Voltage Gain in Inverting Amplifier
- EE07004 Frequency Dependence in Inverting Amplifier
- EE07005 Voltage Adders
- EE07006 Subtractors
- EE07007 Constant Voltage Source Adjustable
- EE07008 Constant Current Source
- EE07009 Non Inverting Amplifier
- EE07010 Voltage Follower
- EE07011 Differentiator
- EE07012 Integrator
- EE07013 Wien-Bridge Oscillator
- EE07014 High Pass Filter
- EE07015 Low Pass Filter

Specification

- **Desktop Module [PTE-023-01],** equipped with:
  - Universal configuration of Operational Amplifier
  - Power Supply
    - Output : DC Fixed 3, 6, 9, 12V
    - Input : AC 220V, 1 phase 50Hz
    - Output connections : 4mm
    - Potentiometer 10k? and 50k?
- **Container Box [PTE-023-02],** consists of:
  - Resistor 470? /1W
  - Resistor 1k5? /1W
  - Resistor 6k8? /1W
  - Resistor 8k2? /1W
  - Resistor 10k? /1W
  - Resistor 15k? /1W
  - Resistor 18k? /1W
  - Resistor 22k? /1W
  - Resistor 33k? /1W
  - Resistor 100k? /1W
  - Resistor 470k? /1W
  - Capacitor 1nF non polar
  - Capacitor 4,7nF non polar
  - Capacitor 10nF non polar
  - Capacitor 100nF non polar
  - Capacitor electrolyte 1µF/16V
  - Zener Diode 5,6V / 0,25W

PT 970232 Operational Amplifier Trainer
consists of

Cat. No.	Description	Qty.
PTE-023-01	Desktop Module, consists of:	1 set
PTE-023-02	Container Box, consists of:	1 set
PEO 340 15	Resistor 470? / 1W	1 pc
PEO 340 19	Resistor 1k5? / 1W	1 pc
PEO 340 23	Resistor 6k8? / 1W	1 pc
PEO 340 24	Resistor 8k2? / 1W	1 pc
PEO 340 25	Resistor 10k? / 1W	1 pc
PEO 340 26	Resistor 15k? / 1W	1 pc
PEO 340 27	Resistor 18k? / 1W	1 pc
PEO 340 28	Resistor 22k? / 1W	1 pc
PEO 340 29	Resistor 33k? / 1W	1 pc
PEO 340 35	Resistor 100k? / 1W	1 pc
PEO 340 41	Resistor 470k? / 1W	1 pc
PEO 411 04	Capacitor 1nF	1 pc
PEO 411 05	Capacitor 4,7nF	1 pc
PEO 411 01	Capacitor 10nF	1 pc
PEO 411 02	Capacitor 100nF	1 pc
PEO 395 08	Capacitor 1µF	1 pc
PEO 365 04	Zener Diode 5,6V / 0,25W	1 pc
FLS 20.02/097	Connecting Cross	10 pcs
KAL 99/40-030	Connecting Lead 30cm, Yellow	20 pcs
E07S-01E	Experiment Manual Book	1 pc



Experiment EE07005 Voltage Adders

Section Boxes

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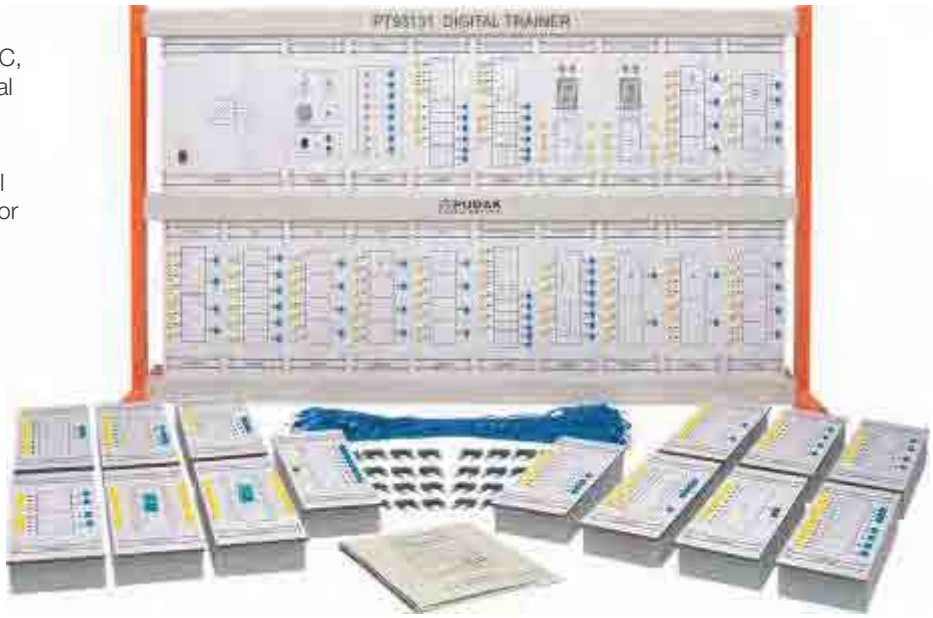
Digital Trainer

PT 93131



Features

- The digital trainer is designed as a teaching aid for digital technology.
- The trainer consists of several functional modules, such as basic gate, flip-flops, multiplexer, demultiplexer, registers, counters, adder, comparator, ADC, DAC, arithmetic logic unit and so on. All digital function symbols printed referring to standard IEEE logic symbols.
- All inputs and outputs terminal of digital function are equipped with LED indicator to indicate current state of inputs or outputs terminal.
- The modules are equipped with over-voltage and over current protector to protect module from damage possibility.
- The system consist of modular block to enable the student to learn the digital technology in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Covered Topics

DE01001E	Logic Gates
DE01002E	The Boolean Algebra
DE01003E	Combinational Logic
DE01004E	De Morgan's Law
DE01005E	Building Logic Circuit Based on A Truth Table
DE01006E	The Karnaugh Map
DE01007E	Adder and Arithmetic Circuits
DE01008E	Designing A Logic Circuits
DE01009E	Flip-Flop Circuits
DE01010E	Multi Vibrator
DE01011E	Counter
DE01012E	Shift Register
DE01013E	Decoder and Encoder
DE01014E	Analog to Digital Converter and Digital To Analog Converter
DE01015E	Multiplexer and Demultiplexer

Specification

- AND Gate Dual Input [PTE-006-01]
  - Supply voltage : +5VDC
  - Consist : 4 Gates/module
- NAND Gate Dual Input [PTE-006-02]
  - Supply voltage : +5VDC
  - Consist : 4 Gates/module
- OR Gate Dual Input [PTE-006-03]
  - Supply voltage : +5VDC
  - Consist : 4 Gates/module
- NOR Gate Dual Input [PTE-006-04]
  - Supply voltage : +5VDC
  - Consist : 4 Gates/module
- XOR Gate Dual Input [PTE-006-05]
  - Supply voltage : +5VDC
  - Consist : 4 Gates/module
- XNOR Gate Dual Input [PTE-006-06]
  - Supply voltage : +5VDC
  - Consist : 4 Gates/module
- NAND Gate Quad Input [PTE-006-07]
  - Supply voltage : +5VDC
  - Consist : 2 Gates/module
- NOT Gate (Inverter) [PTE-006-08]
  - Supply voltage : +5VDC
  - Consist : 6 Gates/module
- AND Gate Quad Input [PTE-006-09]
  - Supply voltage : +5VDC
  - Consist : 2 Gates/module
- RS Flip-Flop [PTE-006-10]
  - Supply voltage : +5VDC
  - Consist : 2 Flip-Flop/module
- JK Master-Slave Flip-Flop [PTE-006-11]
  - Supply voltage : +5VDC
  - Consist : 2 Flip-Flop/module

Continue >>

Training Panel System

>> Specification Continued

- D Flip-Flop [PTE-006-12]
  - Supply voltage : +5VDC
  - Consist : 2 Flip-Flop/module
- Multiplexer 4 bit [PTE-006-13]
  - Supply voltage : +5VDC
  - Consist : 2 Multiplexer/module
- Demultiplexer 8 bit [PTE-006-14]
  - Supply voltage : +5VDC
  - Package : 1 Demultiplexer/module
- BCD to 7 Segments [PTE-006-15]
  - Supply voltage : +5VDC, +15VDC
  - Consist : 1 BCD to 7 Segments/module
- 4 bit Shift Register [PTE-006-16]
  - Supply voltage : +5VDC
  - Consist : 1 Register/module
- Asynchronous Binary Counter [PTE-006-17]
  - Supply voltage : +5VDC
  - Consist : 1 Counter/module
- Asynchronous BCD Counter [PTE-006-18]
  - Supply voltage : +5VDC
  - Consist : 1 Counter/module
- Syn Up/Dn Counter with Parallel Load [PTE-006-19]
  - Supply voltage : +5VDC
  - Consist : 1 Counter/module
- Full Adder [PTE-006-20]
  - Supply voltage : +5VDC
  - Consist : 1 Adder/module

>>

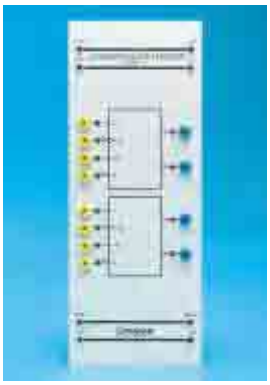
>>

- Comparator [PTE-006-21]
  - Supply voltage : +5VDC
  - Consist : 1 Comparator/module
- 4 bit ALU [PTE-006-22]
  - Supply voltage : +5VDC
  - Consist : 4 bit ALU/module
- Analog to Digital Converter [PTE-006-23]
  - Supply voltage : +5VDC, +15VDC, -15VDC
  - Consist : 1 ADC/module
- Digital to Analog Converter [PTE-006-24]
  - Supply voltage : +5VDC, +15VDC, -15VDC
  - Consist : 1 DAC/module
- Pulse Generator [PTE-006-25]
  - Supply voltage : +5VDC
  - Consist : 1 package/module
  - Frequency outputs : 1 – 10 Hz or 10 – 100 Hz
  - Pulse output : continues or single
  - Direct output or invert output
- IC Socket [PTE-006-26]
  - 16 pin universal ZIP DIP socket
- Power Supply [PTE-006-27]
  - Supply voltage : 220V – 240VAC, 50Hz
  - Voltage output : +15V, -15VDC 1A and +5VDC, 4A
- Switch [PTE-006-28]
  - Contains 8 switches

PT 93131 Digital Trainer
consists of

Cat. No.	Description	Qty.
PTE-006-01	AND Gate (Dual Input)	1 pc
PTE-006-02	NAND Gate	1 pc
PTE-006-03	OR Gate	1 pc
PTE-006-04	NOR Gate	1 pc
PTE-006-05	XOR Gate	1 pc
PTE-006-06	XNOR Gate	1 pc
PTE-006-07	NAND Gate	1 pc
PTE-006-08	NOT Gate	1 pc
PTE-006-09	AND Gate (Quad Input)	1 pc
PTE-006-10	RS Flip-Flop	1 pc
PTE-006-11	JK Master-Slave Flip-Flop	1 pc
PTE-006-12	D Flip-Flop	2 pcs
PTE-006-13	Multiplexer 4 bit	1 pc
PTE-006-14	Demultiplexer 8 bit	1 pc
PTE-006-15	BCD to 7 Segment	2 pcs
PTE-006-16	4 bit Shift Register	2 pcs
PTE-006-17	Asynchronous Binary Counter	1 pc
PTE-006-18	Asynchronous BCD Counter	2 pcs
PTE-006-19	Syn Up/Dn Counter with Parallel Load	1 pc
PTE-006-20	Full Adder	1 pc
PTE-006-21 Compara	tor	1 pc
PTE-006-22	4 bit ALU	1 pc
PTE-006-23	Analog to Digital Converter	1 pc
PTE-006-24	Digital to Analog Converter	1 pc
PTE-006-25	Pulse Generator	1 pc
PTE-006-26	IC Socket	2 pcs
PTE-006-27	Power Supply	1 pc
PTE-006-28	Switch	1 pc
FLS 20.02/097	Connecting Cross	60 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	60 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	10 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	10 pcs
D01S-01E	Experiment Manual Book	1 pc
GSN 245	TPS Frame 1200mm	1 set

AND
PTE-006-01



J-K Master Slave Flip-Flop
PTE-006-11

BCD to 7 Segment
PTE-006-16

4 Bit ALU
PTE-006-22

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Features

- The trainer is designed to teach the fundamental of 8 bit industrial microprocessor. Compact model-only on a single high quality double side board-to make the trainer easy to carry.
- No external software needed to use this trainer, simply type the user program sequence to the trainer on built in keypad.
- Easy to check and change the contents of the registers on microprocessor.
- User's program can run in step by step mode or continuous running.
- User's program can be written in assembly language or BASIC.
- All input output lines and microprocessor buses are available for off-board expansion.
- Provide audio tape interface to record user's program on a cassette and can be reloaded to the trainer in a simple way.
- Wide breadboard area is provided to build an external circuit.
- Complete with comprehensive experiment manual and user's manual book to guide student step by step in conducting experiments.

Microprocessor Trainer

PT 980401

Covered Topics

- DE04001E Introduction to Microprocessor Trainer
- DE04002E Data Transfer Experiment
- DE04003E Basic Application of Arithmetic And Logic Operation
- DE04004E Subtract and Adder Instruction
- DE04005E Loop Program and Branch Instruction
- DE04006E Subroutine and Stack
- DE04007E Rotate, Shift, Instruction and Multiple Routine
- DE04008E Divide Instruction
- DE04009E Binary to BCD Conversion Program
- DE04010E BCD to Binary Conversion Program
- DE04011E Square Program
- DE04012E Game
- DE04013E Stop Watch
- DE04014E Clock
- DE04015E Telephone Tone
- DE04016E Microcomputer Organ
- DE04017E Music Box

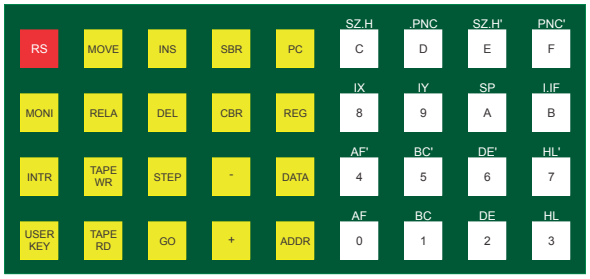
Specification

Processor	: Zilog Z-80
ROM	: 4KB
RAM	: 2KB, expanded to 4KB
Programmable input output	: Z80 PIO 16 bit I/O lines
Controller Timer Counter	: Z80 CTC 4 independent timer counter
Seven Segment	: 6 Digit for data and address display
Speaker	
- Impedance	: 8?
- Power	: 0.5W
- Audio drive included	
Keypad	: 36 keys for data and function entry
Keypad Template	: BASIC and Assembler
Breadboard	
Audio Tape Interface	

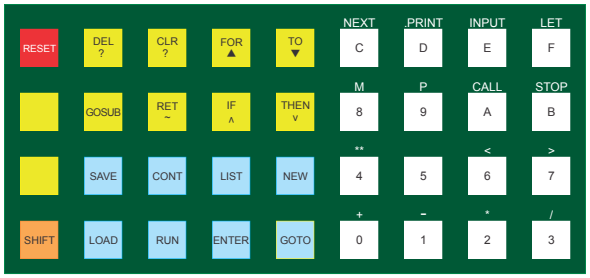
PT980401 Microprocessor Trainer
consists of

Cat. No.	Description	Qty.
PT980401	Microprocessor Trainer Board	1 pc
PEL 223 01	Assembler Keypad Template	1 pc
PEL 223 02	BASIC Keypad Template	1 pc
D04S-01E	Experiment Manual Book	1 pc
D04M-01E	User's Manual Book	1 pc
D04M-02E	Monitor Source Program Listing Book	1 pc

Realtime Clock Using IC 555



Assembler Keypad Template
PEL 223 01



BASIC Keypad Template
PEL 223 02

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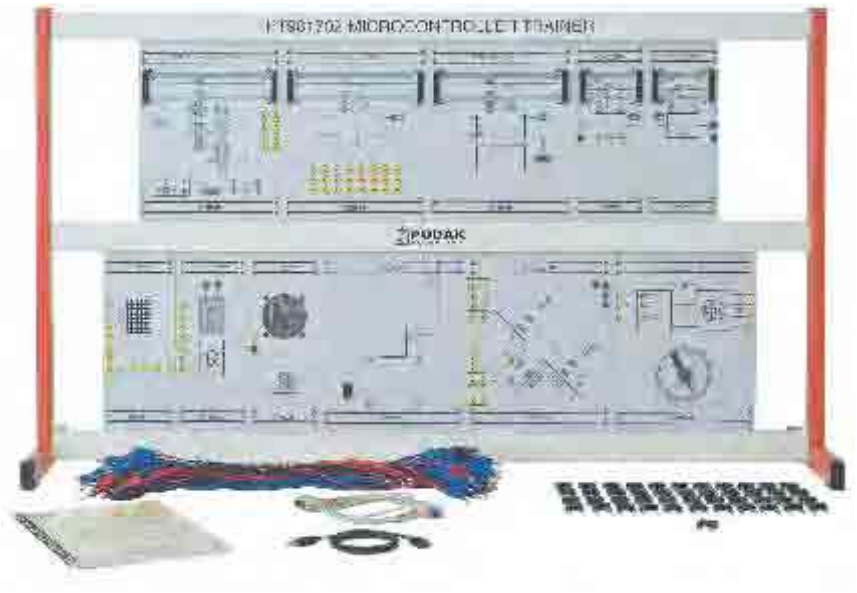
Features

- The Microcontroller trainer is designed to teach the fundamental knowledge of hardware and software of a microcontroller.
- The trainer can be used to demonstrate various device interfacing with microcontroller.
- Provide test point for investigate write or read timing sequence of microcontroller when accessing to another unit. Investigating can be done by using logic probe or logic analyzer.
- Each peripheral unit equipped with selectable DIP-switch for easy to change address of peripheral unit.
- Modules are equipped with over voltage and over current protector to protect module from damage possibility.
- The system consist of modular block to enable the student to learn the microcontroller in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Microcontroller Trainer

PT 981702



Specification

- 8031 Central Processing Unit [PTE-026-01]
  - Based on 8031 microcontroller
  - Clock system: 11.0592MHz or manual clock by pushbutton
  - Program files download via PC USB port (PC not included)
  - EPROM program storage replaced by 8Kbytes RAM
  - External memory: 8Kbyte
  - 2 × 13 bus connectors to connect with other devices
  - RS232 converter
- Parallel Input/Output [PTE-026-02]
  - Programmable input output: 3 × 8 bit
  - 2 × 13 bus connector to connect with other devices
  - Device addressing : selectable by DIP-switch
  - Provide test point
- Serial Input/Output [PTE-026-03]
  - Programmable serial input output
  - Device addressing : selectable by DIP-switch
  - Provide test point
  - Provide RS 232
  - 2 × 13 bus connectors to connect with other devices
- Analog to Digital Converter [PTE-026-04]
  - Resolution : 8 bit
  - Conversion time : 100 microseconds
  - Voltage input : -10V – +10V
  - Provide test point
  - Device addressing : selectable by DIP-switch
  - 2 × 13 bus connectors to connect with other devices
- Digital to Analog Converter [PTE-026-05]
  - Resolution : 8 bit
  - Output voltage : -10V – +10V
  - Provide test point
  - Device addressing : selectable by DIP-switch
  - Provide 2 × 13 bus connectors to connect with other devices
- LED Matrix [PTE-026-06]
  - Input voltage : +5V
  - Large 5 × 7 LED matrix
  - Connected by 4mm connector
  - Drive by transistor

Covered Topics

- DE05001E Introduction to 8031 Central Processing Unit
- DE05002E Interfacing with Digital to Analog Converter
- DE05003E Interfacing with Analog to Digital Converter
- DE05004E Interfacing with Programmable Digital Peripheral Interface
- DE05005E Interfacing with Programmable Serial Communication Interface
- DE05006E Seven Segment
- DE05007E LED Matrix
- DE05008E Stepper Motor
- DE05009E Traffic Light

Continue >>

>> Specification Continued

- Seven Segment [PTE-026-07]
  - Common voltage : +15V
  - Large seven segment (two colors)
  - Type : common anode
  - Drive by transistor
- Loud Speaker [PTE-026-08]
  - Impedance : 8?
  - Power : 1W
  - Power amplifier : 1W
- Power Supply [PTE-026-09]
  - Input voltage : 220V – 240V, 50Hz
  - Output voltage : +15V, 1.5A
    +5V, 1.5A
    -15V, 0.5A
- Traffic Light Model [PTE-MP1-01]
  - Traffic light model to simulate junction of main road and a branch/minor road traffic light system
- Stepping Motor [PTE-MP1-02]
  - Unipolar motor stepper
  - Built in motor stepper controller:
    - Full and half step
    - CW and CCW direction
  - Controlled by built in controller or external logic control
  - Active coil of stepper motor indicated by LED

PT981702 Microcontroller Trainer
consists of

Cat. No.	Description	Qty.
PTE-026-01	8031 Central Processing Unit	1 pc
PTE-026-02	Parallel Input/Output	1 pc
PTE-026-03	Serial Input/Output	1 pc
PTE-026-04	Analog to Digital Converter	1 pc
PTE-026-05	Digital to Analog Converter	1 pc
PTE-026-06	LED Matrix	1 pc
PTE-026-07	Seven Segment	1 pc
PTE-026-08	Loud Speaker	1 pc
PTE-026-09	Power Supply	1 pc
PTE-MP1-01	Traffic Light Model	1 pc
PTE-MP1-02	Stepping Motor	1 pc
GSE 230 15	Standard Serial Cable	1 pc
GSE 230 11	Expansion Connecting Lead, 2 × 13 pin	4 pcs
FLS 20.02/097	Connecting Cross	50 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	50 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	10 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	10 pcs
GSC 700 01	CD PT981702 Microcontroller Trainer	1 pc
D05S-01E	Experiment Manual Book	1 pc
GSN 245	TPS Frame 1200mm	1 set

8031 Central Processing Unit
PTE-026-01

Parallel Input / Output
PTE-026-02

Serial Input / Output
PTE-026-03

A/D Converter
PTE-026-04

LED Matrix
PTE-026-06

Seven Segment
PTE-026-07

Traffic Light
PTE-MP1-01

Stepping Motor
PTE-MP1-02

Specifications and illustrations are subject to change without prior notice

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Servo Trainer

PT 93221

Features

- The trainer is designed to teach the fundamental concept of servo system.
- The trainer will bring fast and easy for the student to understand the servo characteristic, drive technique and control.
- The student will also learn both of analog and digital PID control systems.
- Featuring speed or position data sample recording with adjustable sampling time on digital PID unit, make the student can plot and analyze servo control process using this sampled data.
- The system consist of modular block to enable the student to learn the servo system in modular way. The panel type constructions are easy to handle by student when conducting the experiment.
- All inputs and outputs on each panel are equipped with robust 4-mm sockets for easy connection.
- Complete with comprehensive experiment manual book to guide student step by step in conducting experiments.

Covered Topics

- DE02001E Concept of a PWM Generator and it's Generation
- DE02002E Encoder as a Feedback
- DE02003E Identification of a Plant Characteristic
- DE02004E Open Loop Speed Controller
- DE02005E Closed Loop Speed Controller
- DE02006E Digital Control For Servo Motor Speed (Closed Loop)
- DE02007E Digital Control For Servo Motor Position (Closed Loop)

Specification

- **Analog PID Unit [PTE-014-01]**
  - Input voltage : -10V – +10V
  - Output voltage : -10V – +10V
  - Proportional rate : 0 – 10
  - Correction time : 0 – 100 ms
  - Rate time : 0 – 100 ms
- **PWM Generator [PTE-014-02]**
  - Input voltage : -10V – +10V
  - Output voltage : 0V – +10V
  - Frequency : 30KHz
  - Duty cycle : 0% – 100%
- **Motor Drive [PTE-014-03]**
  - H-bridge transistor
  - Opto isolated input
  - Input voltage : +10V
  - Output voltage : 0V – +10V
- **Motor Assembly [PTE-014-04]**
  - DC servo motor
    - · Input voltage : +12V
    - · Power : 26W
    - · Gear head : 14:1
    - · Optical encoder output : +5V dual channel square waves phase shift
    - · Pulse output : 2484 pulse/ rotation
  - DC load motor
- **Encoder Conditioner [PTE-014-05]**
  - Input : 2 channels +5V square wave
  - Output : - 2 channel digital : +5V square waves
    - 1 channel speed : 0V – +10V
    - 1 channel velocity : -10V – +10V
  - 1× and 2× digital square wave output multiplier
- **Digital Control Unit [PTE-014-06]**
  - Based on microcontroller, able to control speed or position
  - Display : 2 × 16 character Liquid crystal display
  - Kp : 0 – 99
  - Tn : 0 – 99
  - Tv : 0 – 99

Continue >>

>> Specification Continued

- Sampling rate : 2ms – 10ms
- Able to record the data of speed or position
- Keypad function and data entry
- Input feedback : 2 digital square wave
- Output voltage : -10V – +10V

- **Analog Summing Block [PTE-014-07]**
  - Input voltage : -10V – +10V
  - Input feedback : -10V – +10V
  - Output voltage : -10V – +10V
- **Loading Control [PTE-014-08]**
  - Able to control DC motor as a load on Motor Assembly unit
  - Direction : CW or CCW
  - Torque : 0 – 750mNm
- **Tachometer [PTE-014-09]**
  - Input voltage : 0V – +10V
  - RPM output : 0 – 300 rpm
- **Potentiometer [PTE-014-10]**
  - Output voltage : Internal or external
  - Internal output voltage : -10V – +10V or 0 – +10V
- **Function Generator [PTE-014-11]**
  - Wave form : Square, triangle and pulse
  - Frequency range : 10Hz – 2kHz
  - Duty cycle : 0 – 100 %
  - Output level voltage : 0V – +/-10V
  - Pulse voltage output : +5V, +15V
- **Power Supply [PTE-014-12]**
  - Input voltage : 220 – 240V, 50Hz
  - Output voltage : +15V, 1.5A
+5V, 1.5A
-15V, 0.5A

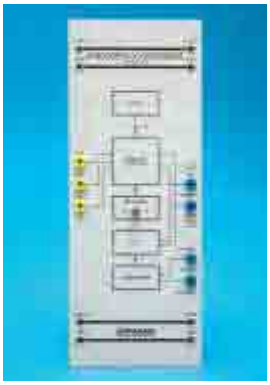
PT 93221 Servo Trainer
consists of

Cat. No.	Description	Qty.
PTE-014-01	Analog PID Unit	1 pc
PTE-014-02	PWM Generator	1 pc
PTE-014-03	Motor Drive	1 pc
PTE-014-04	Motor Assembly	1 pc
PTE-014-05	Encoder Conditioner	1 pc
PTE-014-06	Digital Control Unit	1 pc
PTE-014-07	Analog Summing Block	1 pc
PTE-014-08	Loading Control	1 pc
PTE-014-09 T	achometer	1 pc
PTE-014-10 P	otentiometer	1 pc
PTE-014-11	Function Generator	1 pc
PTE-014-12	Power Supply	1 pc
FLS 20.02/097	Connecting Cross	60 pcs
KAL 99/30-050	Connecting Lead 50cm, Blue	15 pcs
KAL 99/10-050	Connecting Lead 50cm, Black	10 pcs
KAL 99/20-050	Connecting Lead 50cm, Red	10 pcs
KAL 99/30-100	Connecting Lead 100cm, Blue	10 pcs
D02S-01E	Experiment Manual Book	1 pc
GSN 245	TPS Frame 1200mm	1 set

PDP Unit
PTE-014-01

P.W.M Generator
PTE-014-02

Motor Assembly
PTE-014-04



Encoder Conditioner
PTE-014-05

Digital Control Unit
PTE-014-06

Tachometer
PTE-014-09

Potentiometer
PTE-014-10

Function Generator
PTE-014-11

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